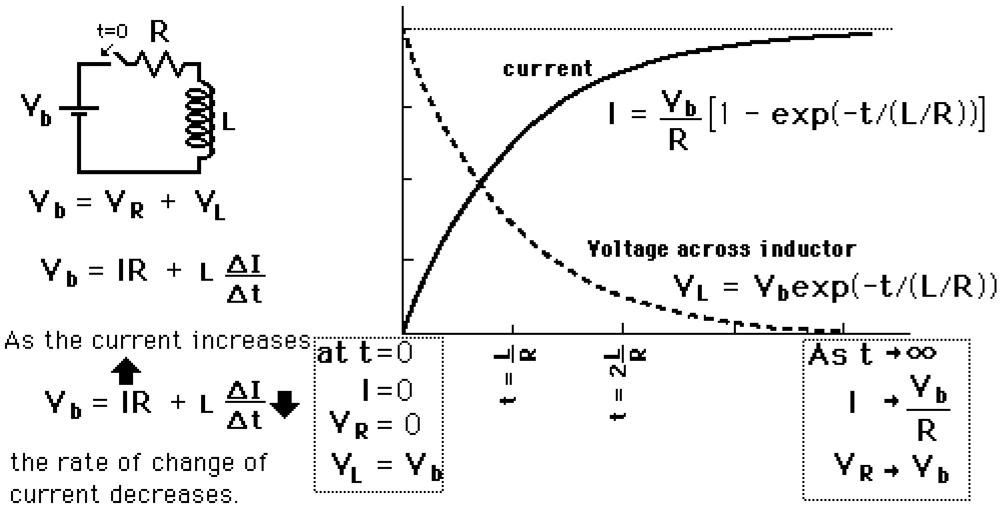
Inductor Transient

When a battery is connected to a series resistor and inductor, the inductor resists the change in current and the current therefore builds up slowly. Acting in accordance with Faraday's law and Lenz's law, the amount of impedance to the buildup of current is proportional to the rate of change of the current. That is, the faster you try to make it change, the more it resists. The current builds up toward the value it would have with the resistor alone because once the current is no longer changing, the inductor offers no impedance. The rate of this buildup is often characterized by the time constant L/R . Establishing a current in an inductor stores energy in the magnetic field formed by the coils of the inductor.



Calculation

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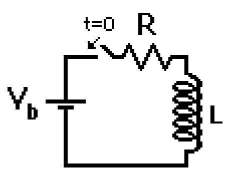
Inductor Transient Calculation



For circuit parameters:

R = Ω, V_b = V

L = H, L/R = s = time constant.

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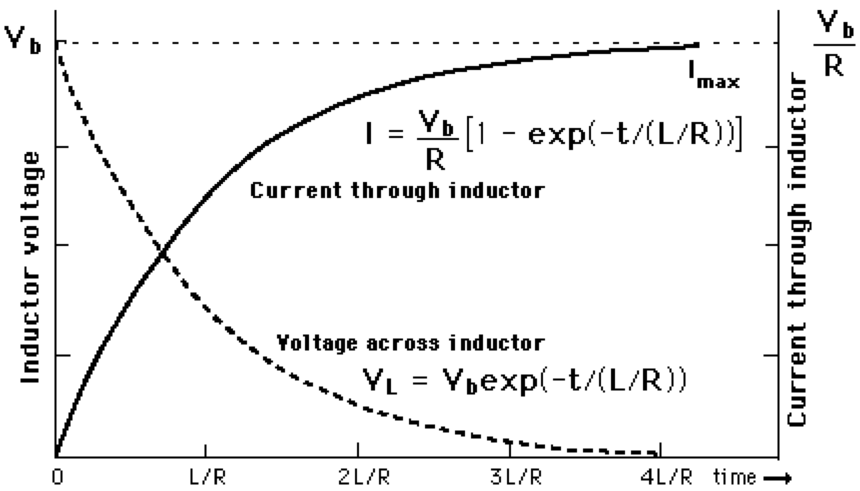
DC Circuits



Inductor Concepts	

This circuit will asymmtotically approach a maximum current of $I_{max} = \frac{V_b}{R} =$ ______ A

since the inductor voltage approaches zero.

At time t = ______ s= ______ L/R

The charging current is = ______ I_{max} = ______ A

and the inductor voltage is = ______ V_b = ______ V

Inductor transient discussion

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